CLAIMS

WHAT IS CLAIMED IS:

1. A method for the identification and quantification of admixtures of at least a first and a second biomolecular variant comprising:

applying at least one condition gradient upon a detection array along a gradient axis having discrete locations, wherein the gradient conditions affect at least one of the rate of binding or reaction between the variants and at least one reactant;

measuring the rate of binding or reaction between the variants and the at least one reactant at the discrete locations along the gradient axis at discrete times; and

analyzing measurements of the rate of binding or reaction from the discrete locations along the gradient axis at discrete times to determine the quantities of each of the first and a second biomolecular variant present in the admixture.

2. The method of claim 1, further comprising applying a second condition gradient upon the detection array along a second gradient axis, wherein the gradient conditions affect the rate of binding or reaction between the variants and the at least one reactant.

3. The method of claim 2 wherein the second gradient axis is perpendicular to the first condition gradient.

4. The method of claim 1, wherein the at least one condition gradient is selected from the group comprising a pH gradient, a light absorption gradient or a temperature gradient.

5. A method for the discrimination of biomolecules in an admixture comprising the steps of:

a. obtaining a sample comprising at least a first and a second biomolecule;

b. exposing the sample to at least one gradient condition along a gradient axis to alter the inherent charge of the biomolecules;

c. contacting the biomolecules with at least one reactant to cause the formation of at least one reaction product; and

d. detecting at least one of a rate of binding between the biomolecules and the at least one reactant or a rate of reaction between the variants and the at least one reactant at discrete locations along the gradient axis.

6. A method for the discrimination of biomolecules in an admixture comprising the steps of:

a. obtaining a sample comprising at least first and a second biomolecule;

b. exposing the sample to at least one gradient condition along a gradient axis to alter the inherent energy of the biomolecules;

c. contacting the biomolecules with at least one reactant to cause the formation of at least one reaction product; and

d. detecting at least one of a rate of binding between the biomolecules and the at least one reactant or a rate of reaction between the variants and the at least one reactant at discrete locations along the gradient axis.

7. A method for the discrimination of biomolecules in an admixture comprising the steps of:

a. obtaining a sample comprising at least first and a second biomolecule;

b. exposing the sample to at least one gradient condition along a gradient axis to alter the inherent energy and inherent charge of the biomolecules;

c. contacting the biomolecules with at least one reactant to cause the formation of at least one reaction product; and

d. detecting at least one of a rate of binding between the biomolecules and the at least one reactant or a rate of reaction between the variants and the at least one reactant at discrete locations along the gradient axis.

8. The method of claim 5, 6 or 7 further comprising the step of quantifying the amount of the first or the second biomolecule in the sample from the rate of binding between the biomolecules and the at least one reactant or a rate of reaction between the variants and the at least one reactant measured at discrete locations along the gradient axis at discrete time periods.

9. The method of claim 5 or 7 wherein the gradient condition used to alter the inherent charge of the biomolecules is a pH gradient.

10. The method of claim 6 or 7 wherein the gradient condition used to alter the inherent energy of the biomolecules is light absorption.

11. The method of claim 1 wherein the reaction product is detected using electrochemical detectors.

12. The method of claim 1 wherein the reaction product is detected using photochemical detectors.

13. The method of claim 1 wherein the biomolecules are selected from the group comprising proteins, deoxyribonucleic acids, ribonucleic acids or prions.

14. A detection array for the identification and quantification of admixtures of two or more biomolecular variants comprising:

a substrate;

means for applying at least one condition gradient upon the substrate along a first gradient axis having discrete locations, wherein the gradient conditions affect at least one of a rate of binding or a rate of reaction between the biomolecular variants and at least one reactant;

a means for measuring of the rate of binding or rate of reaction between the biomolecular variants and a reactant at discrete locations along the gradient axis at discrete times; and

a means for analyzing measurements of the rate of binding or rate of reaction from the discrete locations of the substrate at discrete times to determine the quantities of each biomolecular variant present in the admixture.

15. The detection array of claim 14, further comprising applying a second condition gradient upon the substrate along a second gradient axis, wherein the gradient conditions affect the rate of binding or reaction between the variants and the reactant.

16. The detection array of claim 15 wherein the second gradient axis is perpendicular to the first condition gradient axis, and wherein the gradient conditions affect the rate of binding or reaction between the variants and the at least one reactant

17. The detection array of claim 14, wherein the at least one condition gradient is selected from the group comprising a pH gradient, a light absorption gradient or a temperature gradient.

18. A detection array for discrimination of similar biomolecules in an admixture comprising:

a substrate having an upper surface area;

a reaction chamber upon the substrate upper surface area;

at least one pair of gradient electrodes affixed to the substrate, wherein application of a current to the gradient electrodes creates a pH gradient along a gradient axis;

at least a first and second pair of detection electrodes affixed to the substrate upper surface area, wherein each pair of detection electrodes is spaced at a distance apart on a reaction axis; and wherein the detection electrodes sense changes of one or all of the biomolecules, reactants or reaction products in the reaction chamber at discrete times; and

control electronics operably connected to gradient electrodes and detection electrodes.

19. A detection array for discrimination of similar biomolecules in an admixture comprising:

a substrate having an upper surface area;

a reaction chamber upon the substrate upper surface area;

at least two reactant regions spaced at a distance apart on the substrate upper surface area;

a light source, wherein activation of the light source creates an illumination gradient along an illumination gradient axis upon the substrate upper surface area;

an imaging device for detecting photochemical changes of one or all of the biomolecules, reactants or reaction products in the reaction chamber at discrete times; and

control electronics operably connected to the light source and imaging device.

20. A detection array for discrimination of similar biomolecules in an admixture comprising:

a substrate having an upper surface area;

a reaction chamber upon the substrate upper surface area;

at least two reactant regions spaced at a distance apart on the substrate upper surface area;

a thermal source wherein activation of the thermal source creates a temperature gradient along a gradient axis along the substrate upper surface area;

an imaging device for detecting photochemical changes of one or all of the biomolecules, reactants or reaction products in the reaction chamber; and

control electronics operably connected to the thermal source and imaging device.

21. A detection array for discrimination of similar biomolecules in an admixture comprising:

a substrate having an upper surface area;

a reaction chamber upon the substrate upper surface area;

a thermal source wherein activation of the thermal source creates a temperature gradient along a gradient axis along the substrate upper surface area;

at least a first and second pair of detection electrodes affixed to the substrate, wherein each pair of detection electrodes is spaced at a distance apart on a reaction axis, and wherein the detection electrodes sense changes of one or all of the biomolecules, reactants or reaction products in the reaction chamber at discrete times; and

control electronics operably connected to the thermal source and detection electrodes.

22. The device of claim 18 further comprising a light source, wherein activation of the light source creates an illumination gradient along an illumination gradient axis upon the substrate upper surface area;

23. The device of claim 19 further comprising at least one pair of gradient electrodes affixed to the substrate, wherein application of a current to the gradient electrodes creates a pH gradient along a gradient axis.

24. The device of claim 18 or 23 further comprising at least one reference electrode affixed to the substrate and operably connected to the control electronics.

25. The device of claim 18 or 23, wherein the first pair of detection electrodes is covered by a reaction matrix.

26. The device of claim 18 or 19 further comprising a thermal source, wherein activation of the thermal source creates a temperature gradient along a gradient axis.